

166
A
L E T T E R

C O N C E R N I N G

E A R T H Q U A K E S ,

Written in the Year 1693,

By the late celebrated Astronomer,

Mr. JOHN FLAMSTEED, Math. Reg. F. R. S. K

T O A

GENTLEMAN then residing at *Turin* in *Savoy*,

On Occasion of

The Destruction of *Catanea*, and many other
Cities, Towns and Villages, in *Sicily*, in the
Year 1692.

L O N D O N :

Printed for A. MILLAR, opposite *Catharine-street*
in the *Strand*. MDCCL.

Ann Pray
2 ~~Nov~~ November
1794

Ann Pray² November
1794

my Dear

to your and fortune



Advertisement.

THE late Earthquakes having occasioned several Attempts to account for the natural Causes of a Phenomenon so extraordinary in itself, and so unusual in this Part of the World, the Curious will probably thank me for giving them this Opportunity of seeing the late famous Mr. FLAMSTEED's Sentiments on that interesting Subject. The Historical Circumstances which he has collected will, I imagine, prove generally entertaining: But I need say no more in Recommendation of this Piece, than to assure the Reader that it is genuine, and printed from a Copy taken under the Author's Eye, and by him sent inclosed in the following Letter to a Friend.

The Observatory, *May 1, 1693:*

“ **Y**OU will easily pardon the Faults of the inclosed Copy of my Letter concerning Earthquakes when I have told you 'tis your Niece's Hand, and her first Performance of this Kind. The last Paragraph she would needs omit, as not material, tho' I thought it most so, because I thereby covenant with my Friends not to suffer any Copy of it to be conveyed to the Press; foreseeing it would draw a troublesome Tribe of Objectors upon me, who would never be satisfied so

“ long as they could wield a Pen, and engage me to
“ give them Answers ; tho’ my whole Time is too
“ little for the Work on my Hands, which I would
“ not have intermitted, and have therefore resolved
“ that if any Copy of it do find its way to the Press,
“ and draw Objections on me, I will not be obliged
“ to take any Notice of them. I shall be in Town,
“ God willing, on *Wednesday* Morning next, and
“ then wait on you to settle the real Concern which
“ was but just mentioned at our last Meeting.

I am, Sir,

Your very humble Servant,

JOHN FLAMSTEED.

T O

Mr. *Charles Chamberlaine*, Merchant,
at his House in *Leaden-Hall*
Street,

L O N D O N.



A
LETTER
Concerning the
NATURAL CAUSES
O F
EARTHQUAKES.

Royal Observatory at *Greenwich*, April 10, 1693.

S I R,



THE Account you have sent your Friends of the late dreadful *Sicilian* Concussions, are, like those of an Historian, large and particular enough as to the Damages done by them to that at present unhappy Island. I could wish they had been accompanied with Particulars of the State of the Air before, at, and immediately after them; or such other Circumstances, as by the Sequel of

B

this

this Letter you find remarkable in Earthquakes.

For, not many Years since, discoursing with some ingenious Merchants who had liv'd long at *Smyrna* (where they happen more frequently than with us) they acquainted me with several Circumstances attending them; which seemed also to intimate, that the Earth itself was not at all moved, excepting near those Places where Noises were heard under Ground, and Eruptions happened, such as we hear of now from *Sicily*, and lately had Accounts of from *Jamaica*, where a like dreadful Earthquake happened the first of *June* last. A Sea Captain, my Neighbour Captain *Guy*, was ashore in that Island when it began; and his Relations confirm all that was told me by our *Smyrna* Merchants. *September* the 8th last, we had a small Earthquake here, and I have since met with a Book of *Keckerman's*, concerning such another that happened just 91 Years before, *September* the 8th. 1601. at two a Clock in the Morning. From hence, and from the Relations I had from those who felt the above-mentioned, I have gathered the following Circumstances of Earthquakes. What I have deduced from them will, perhaps, appear strange to you, at first; but when you have considered of it, I am apt to believe you will not think it wholly unreasonable. The Circumstances are these.

I. That Earthquakes always happen in calm Seasons. This *Keckerman* affirms, and backs it

it with the Consent of *Aristotle* and *Pliny*. The 8th Day of *September* last, was a very calm Day here, but cloudy. My Sea Captain, who was ashore at *Jamaica* when the Earthquake began, and the printed Relations agree, that it was a calm, clear Day there as could be; and our *Smyrna* Merchants say, that theirs always happen in calm, still Weather.

II. That a small, hollow Noise in the Air always precedes them, so near (see the Account of another, *Philosophical Transactions*, Numb. 151. Page 311.) that it rather seems to accompany them. This Noise was heard by many that lived in the out Streets and Alleys of *London*, remote from the Noise and Tumults of the greater Streets. *September* the 8th last, my Servant, who sat alone in the Kitchen, heard it plainly; and feeling the Shocks attending it, knew it to be an Earthquake, having heard the like Noise in an Earthquake that happened at *Endon* in *Staffordshire*, and in many Places of *Cheshire*, six or seven Years before, and about the same Time of the Year.

III. That they are felt at Sea as well as on Land. Our Merchants say, that though the Waters in the Bay of *Smyrna* lie level and smooth as a Pond, yet Ships riding there feel the Shocks very sensibly, but in a very different Manner from the Houses at Land; for they heave not, but they tremble, their Masts shiver as if they would fall to pieces, and their Guns start in their Carriages, tho' the Surface of the Sea lie all the Time calm and unmov'd. In

Mr. *Hook's Philosophical Collections*, Numb. 6. Page 185. we are told, that a Ship felt a Shock in the main Ocean; that the Passengers, who had been asleep in their Cabins, came upon Deck in a Fright, fearing the Ship had struck upon some Rock; but on heaving the Lead, found themselves out of Soundings.

IV. That some Earthquakes shake many and large Countries, all nearly at one and the same Instant: Others spend some considerable Time, only in travelling a few Miles. *Keckerman* assures us, that the Earthquake of September the 8th 1601. was felt in Part of *Asia*, all over *Thrace*, *Hungary*, *Bobemia*, *Germany*, *Italy*, and *France*, at the same Time; ours, 91 Years after it, was felt all over *France*, the *Netherlands*, and adjacent Parts of *Germany*, with the South of *England*, at the same Time; but in the North of *England* (where it rain'd) and in *Scotland* (where it rain'd and blew a Storm) I am told it was not felt: I have also been told it was felt severely in *Italy*, but I have seen no printed Relations of it; whereas the Earthquake which my Servant felt six or seven Years before in *Staffordshire*, was not perceiv'd any where that I can hear of, but there, and in the neighbouring Parts of *Cheshire*.

Dr. Holder tells us of another, which happened near *Oxford*, January 19th 1665-6; that it was at *Stanton* about 6 o' Clock or later, but had been at *Bleckington* a good while sooner; and that there it was in the further Part of the Garden some very discernable Time before it
was

was observed by those in the House, creeping forward from one Place to another. *Bleckington* is 5 Miles from *Stanton*, and each about as far from *Oxford*, in the Maps; so that this Earthquake spent some very discernable Time in travelling only 5 or 6 Miles. See Dr. *Wallis* his Relation of it in the *Philosophical Transactions*, N^o 10, p. 169. from which I have transcribed this Relation verbatim.

V. That Subterraneous Noises, Explosions, and Eruptions, commonly precede or accompany such as are of any large Extent; but not all the great ones. *Keckerman* tells us, that *September* the 8th 1601. about two a Clock in the Morning, under a Hill in *Switzerland*, called by the the Inhabitants *Bouiac*, by others *Pilate's Mountain*, there were heard great and terrible Noises, that a great Smoke arose from the Top, which fill'd the whole Country thereabouts, and at last the greatest Part of it was thrown off, with a terrible Noise, into the Lake of *Lucerne*, that lay under it; and that at the same Time, on the other Side of that hilly Track which borders on the *Underweldt*, a Part of a Hill was likewise overthrown, which kill'd seven of the Inhabitants. Sir *C. W.* assures me he has seen the Foreign Gazettes of *October* last (as he remembers) which tell us, that the same *September* the 8th last (when our Earthquake happen'd here) the Cap of a Mountain in *Steirmark* was thrown off by an Eruption, and choaked the Course of a River for 7 Miles. Great Noises were heard in the Mountains before

fore the last Earthquake in *Jamaica*, as my Sea Captain and the printed Relations both affirm. The like, it seems, were heard in *Sicily*, before the late Concussions ; but I hear of no Noises under the Earth before the small *Staffordshire* and *Oxford* Earthquakes ; nor of some other like little ones, whereof my Friends inform me : And as for the Earth overturn'd by those subterraneous Explofions and Eruptions, it seems not to have been very many Fathoms thick over the Cavities where and from whence they were made ; and tho' it appear vast compar'd with Hillocks and Garden-plots, yet, if compar'd with a whole Province or Country, it seems very small and inconsiderable.

It is further particularly remarkable of our late Earthquake *September* the 8th last, and may perhaps have happen'd, tho' we have had no Account of it, in others, *viz.*

VI. That it was felt very sensibly and much in the upper Stories of Houses, both in *London* and in the Country, and less, or not at all, in the ground Stories and Cellars.

VII. That many People found themselves suddenly sick at Stomach, and their Heads dizzy and light, so that those who had formerly had Fits of Apoplexies dreaded their Return : Particularly, one Gentleman, a Surgeon, feeling himself so affected, turn'd to his Window, and placing his Elbows in it, rested his Head betwixt his Hands, in which composed Posture he felt four Shocks ; the two first small, the third biggest, the fourth least ; but feeling no

further ill Consequence, rose (with the Fear nevertheless of a sudden Fit approaching) and a Resolution to be let blood for Prevention, without suspecting any thing of an Earthquake. It is further remarkable that, where many Persons were together in the same Room, some were thus affected, others not; some felt the Shocks, others nothing of them.

Reflecting on these Circumstances, and considering further what Varieties of Substances, Sand, Gravel, Stones, Rocks, Minerals, Clay, and Mould, our Earth is compounded of, and how little Nitre or Explosive Matter a large Quantity thereof will afford, I cannot think where we can find Matter enough to move so vast a Bulk of Earth, as all the South Parts of *England*, all the *Netherlands*, with Part of *Germany*, all *France*, and perhaps *Italy*, (which were shock'd at once *September* the 8th last) or Part of *Asia*, and near all *Europe*, which trembled together the same Day 91 Years before. But allowing there may have been sufficient Matter prepar'd for these Purposes, I can hardly think there are continued Cavities at any reasonable Depth under all *Europe*, wherein an Explosion being made might shake the whole at once, and yet make no Clefs, or Separations, in those Parts where the Minerals and mountainous Rocks part from the light Moulds and Clays. If an hundred Barrels of Gunpowder could be fixed in some Cave a thousand Yards under Ground, allowing the Force of the Explosion sufficient to raise all the Weight of
of

of Earth incumbent on the Cavern, it would certainly break the loose Mould from any large solid Rock we may conceive adjacent, and leave at least some Clefs behind it ; but we seldom or never hear of any such Clefs made in such Places when Earthquakes happen ; only we are told of the Caps of a Mountain or two thrown off, and those perhaps not many Fathoms thick ; or of some few Towns sunk, where the Earth under them was worn away to some inconsiderable Thickness, by subterraneous Fires ; as it is at this Day in some Parts of *Italy*, and I doubt not in many Parts of *Sicily*. But granting such a vast Cavern under all the Earth of *Europe*, and sufficient Matter in it to make such an Explosion as may shake all its vast Bulk at once,

I. I conceive it will be hard to shew how such a Shock within the Earth should so affect the outward Air, as to render it perfectly still and calm ; and consequently why Earthquakes should not happen as commonly in rainy or stormy, as in clear Weather.

II. I cannot conceive why Noises should always be heard in the Air when Earthquakes happen ; nor why they should not be heard every where under the Earth, as well as in those Places in or near which Eruptions are made.

III. 'Tis more hard to imagine how the Earth should be shook under the Waters, and the Ships riding on them tremble, or receive a Shock, as if they had struck upon a Rock, and yet

yet the Waters themselves between them remain unmov'd : This my Sea Captain confess'd could not sink into his Head.

IV. I cannot apprehend (if all Earthquakes must be made by Explosions in subterraneous Caverns) why sometimes a large Country, or whole Continent, should be thereby shook all at once, and

V. At other Times, only a small Part in the Middle, or some Corner of it, and that successively and slowly ; nor why there should not be Eruptions as well when small as great Earthquakes happen.

'Tis absurd to affirm that any Explosion, at a considerable Depth under the Earth, shall shake the upper Stories of Houses sensibly more than the lower, considering what a small Proportion the Height of an House bears to the Thickness of the Shell of Earth (if we must allow one) that it is supposed to stand on.

And 'tis little less, so to say, that such Explosions make some People walking on the Earth's Surface sick or lightheaded, while others are not affected.

'Tis improbable then that Earthquakes of any large Extent should be caused by subterraneous Explosions, or even small ones, where there are no Eruptions in the Neighbourhood. All the fore recited Circumstances seem to point out our liquid and fleeting Air to be the Place in which their abstruse, effective Cause resides, and there we shall find it, or at least the greatest Part of it.

And tho' we cannot probably conceive it to be affected by close Explosions, at great Depths under Ground, yet may we easily imagine it to receive strange Alterations, by Vapours emitted from Hollows under Ground into it, and wonderful Accidents effected by them in it : For

Our Sea Captains, and Mariners, that have been in great Sea-Fights affirm, that though it blew a stiff Gale when two Fleets first engage, yet, by that time they have changed half a Score Broadfides, the Wind ceases, and all is calm. Now if the Firing of one or two hundred Barrels of Gunpowder can, by its Explosion in our Air, make so sudden a Calm, why may not like Causes (though not so obvious to our Senses) by making like Explosions in our Air, produce the like Effect, *viz.* The Calm before the Earthquake.

You will ask, how Explosions are made : I must answer, I know not whether it be by dissolving some glutinous Matter that holds the nitrous Particles close wrapt up, like Springs in Watches, and so permitting them to explicate themselves, or otherways ; for all our Knowledge is but a Train of Comparisons, which are clear and distinct when abstracted from Matter, as in Geometrical Contemplations, but dark and obscure when involved with it, as in this Subject. All I can pretend to is, by comparing some of the afore-mention'd Circumstances of Earthquakes with Accidents more common amongst us, and which we think we understand well enough, to shew you such Similitudes

tudes as may satisfy you that both proceed from like Causes, which how they operate we must be content to be ignorant, till we rest in the Bosom of Providence, the first Cause, where they lie hid, and whither all the Considerations of Nature lead us. Enquire not therefore how Explosions are made. I will tell you farther,

That when the great Guns are discharged at the *Tower*, or on the River, tho' it be four Miles from my House, the Explosion shakes my Windows. When a Powder-mill blew up some Years ago on *Banstead Downs*, an House but an hundred Yards to Windward receiv'd no Damage, but another six Miles distant to Lee-ward had all the Windows broke and shatter'd. When the Bridge of *Antwerp* was blown up (at such Time as the Prince of *Parma* besieged the Town) by a Mine of Gunpowder and Composition, placed in a large strong Lighter, the Historian says the Blow was felt many Miles off. Hence you may easily conclude the vast Force and Extent of Explosions made in our Air.

But because the common People have seen their Houses shaken and overturned, in Places where the Earth has been worn from under them, and Explosions made in the Cavern, they have therefore used to say, whenever their Houses shake, that the Earth shakes; and so to rest satisfied with this as a general Reason of Earthquakes. Use gives Passports to Words, and therefore the Nature and Causes of Things are not to be derived from the Expressions of the common People; for they express them-

selves hastily, and as well as they can, in Things they understand not at all ; and when any of them tells you that the blowing up of a Mine or Magazine of Gunpowder made the Earth shake at such a Distance, if you urge him to think better on't, he will tell you that he meant not that the Earth, but that the Houses standing on it, shook.

How simple a Body soever our Air seems to be, yet I doubt not but, upon serious Reflection, you have concluded it to be a vast Compound of aqueous, oily, saline, nitrous, sulphureous, and other Particles, of which some may possess the greater Part in a certain Space at one Time, others at another.

And how feeble and fleeting soever most People think it, you know it has a vast Force, both by its Weight and Spring. For the *Torricellian* Experiment shews plainly, that its Pressure on the Surface of the Earth is not less than that of a Floor of Quicksilver spread round it, near 30 Inches thick ; the Force of its Spring you know from Mr. *Boyle's* Experiments made in the Air Pump.

This noble Author shews us further, how Explosions or Accensions may be made in our Air, by mixing certain Liquors that seem to promise no such thing of themselves. I had rather remit you to your own Memory, or to his Books, which I know you have read, than trouble you with a Repetition of them, in a Paper I design to make as short as I can. And if so, I see no Reason why Vapours kindled
under

under our Earth, breaking from its Caverns, and mixing with the nitrous, sulphureous, and other Particles in our Air, may not cause Explosions in it, which may render People of crazy Stomachs or Constitutions light-headed, or sick at Stomach, whilst those of stronger Tempers may not be affected with it; as weak and tender Creatures shut up in the Air-pump, sicken on the first Attenuation of the included Air by Exhaustion, whilst stronger are little or nothing concern'd.

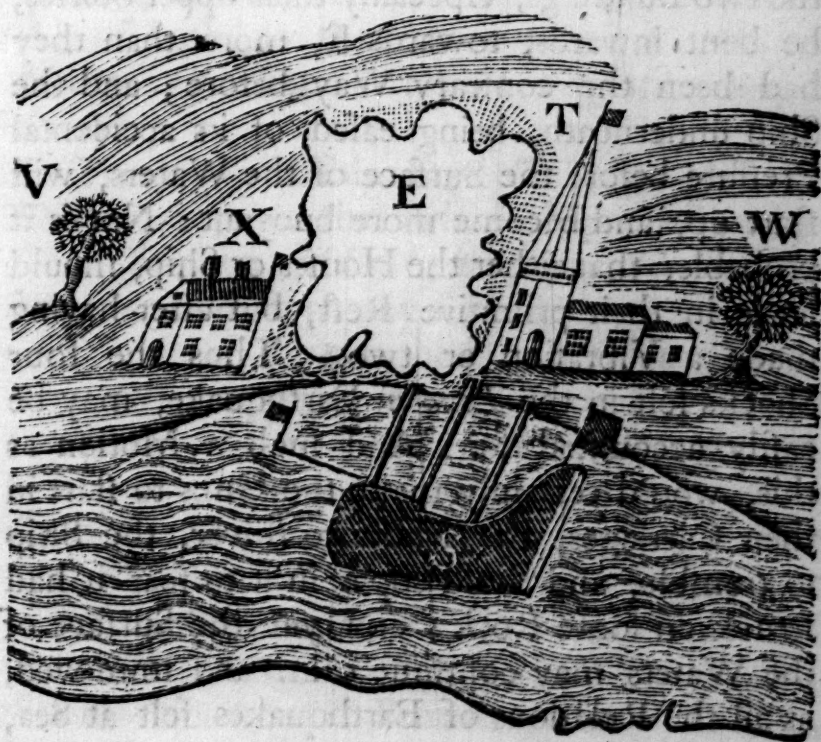
Nor will it be difficult to apprehend how an Explosion may be spread all over *Europe* in a short Time: Conceive a large Sheet, spread thin with Gunpowder, to be extended all over it; if this be fired in the Middle, the whole may blow up in a few Minutes; but Flame catches, you'll say, but slowly upon Gunpowder; consider then that Sound moves full fifteen Sea Miles in a Minute of Time, but Light, tho' not instantaneous, as is proved by the Observations of *Jupiter's* Satellites, ten thousand times as swift, and then you will easily conceive that an Explosion may be propagated, through the pure, nitrous, or sulphureous Particles of our Air, much swifter than Sound, or the Flame upon Gunpowder, tho' not so swift as Light; so that if at the same Time of our late Earthquake, *September* the 8th last past, the Explosion began in *Steirmark*, by the Vapours emitted from the Caverns of the Mountain whose Top was thrown off, mixing with our Air, it might

might spread over all *Europe*, where the Air was prepar'd to receive it, in a few Minutes.

But, you'll say, no Flashes of Light extraordinary were seen in the Air at this Time. I grant it; but we see not the Light of a Candle placed at a good Distance from us in the Sunshine, nor the Particles of Nitre and Sulphur swimming in our Air; must we therefore affirm, against Reason and Experience, there are none in it? Perhaps you will argue that, however, some extraordinary Light ought to be seen in our Air, when Explosions are made in the Dark of the Night. I answer, perhaps it may be so; for tho' none of those who have hitherto given us Accounts of Earthquakes take notice of this Particular, that I can hear of; yet they say nothing to the contrary. But 'tis more probable there is not any Light extraordinary; for the Particles of Nitre and Sulphur, swimming in our Air, are so very slender, small and loose, that their Light, when they are kindled, may be too subtile an Object for our Sense of Sight, which Microscopical Observations shew us is only capable of seeing pretty gross Objects, such as we can feel with our Fingers; and not all of them neither; for we can feel the Wind pressing against our Hands and Fingers, yet we see it not.

You may think, perhaps, that some great and strange Noises ought to be heard in the Air, if such Explosions were made there; but that does not necessarily follow: For if Gunpowder spread thin on a Paper be fired, it makes but a
small

small Noise, tho' when fir'd from the Cylinder of a Gun, into which it had been forced down with a Rammer, it gives a large Report. There is something wanting in our Air, besides the Guns and Rammers, to make it give a smart Report when an Explosion is made in it. A small Noise always accompanies the Earthquake, and that is a sufficient Argument of an Explosion then made in our Air. Allow this, and it will follow that our Houses at Land shall be shook thereby, as we find by Experience they are, and Ships at Sea, as our Mariners affirm, without any sensible Motion of the Waters in which they ride.



Conceive an Explosion made in our Air at E,
betwixt the Buildings T and X, and over the
Ship

Ship S; if the Air be thereby forced off every Way, as 'tis commonly suppos'd in the firing of Great Guns, it will press and bend the Buildings T toward W, and X towards V; and the uppermost Stories the most, because most flexible, being highest and slightest built; and the Air under E, being press'd on the Ship S, and striking its upper Deck, before it forces on the Surface of the Waters, will sink it a little deeper into them.

As the Air springs back, to fill up the attenuated Spaces to E, it will rebend T and X towards it, and hereby, the natural Motion of Restitution will be assisted; and, consequently, the two Buildings, especially their upper Stories, be bent inwards, towards E, more than they had been the contrary Way before; and the Ship underneath, being eased of its accidental Pressure before the Surface of the Waters, will start up, and become more buoyant: Nor is it probable, that either the Houses or Ship, should settle in their primitive Rest, but after having made a Vibration or two. Thus the four Shocks felt in the *London* Earthquake, may be easily accounted for: And such a Motion as this, wou'd certainly make the Guns to start in their Carriages, the Masts to shiver, the Ship to tremble, and the People in it to fear it had struck on some Rock; and yet the Surface of the Waters may continue calm and unmoved, as all the Relations of Earthquakes felt at Sea, tell us they do all the while.

If

If you conceive the Explosions, greater or less in distant Places, according to the different Quantities of nitrous, sulphureous, and other explosive Particles in the Air of those Places, you will easily apprehend, how a great Variety of Attenuations and different Motions may be produced in it, which will have all the same, or like Effects, and render the Earthquakes, more or less felt, and in different Manners, in those distant Places.

You will easily apprehend, why our late Earthquake was not felt in the North of *England*, nor in all *Scotland*: The Rains that fell that Day in both, having precipitated all the explosive, nitrous, and sulphureous Particles in the Air of both, so that there was not sufficient Matter to make a sensible Explosion left in either.

'Tis not probable that the small *Cheeshire* Earthquake, nor that which happened at *Oxford*, *Jan.* 19. 1665-6, were caus'd by Vapours emitted from any subterraneous Caverns, or Eruptions; for we hear not of any Eruptions that happen'd, in or near those Places at that Time, or if they did, How came the last to move so slowly, or over so small a Track of Ground? We must seek some other or like Cause for them; and Dr. *Lister* supplies us with a very probable one, in the *Philosophical Transactions*, Numb. 157, where he argues, that the inflammable Breath of the Pyrites, (a Stone that yields all the Sulphur we have in

D *England*)

England) is the Cause, not only of our Earthquakes, but of Thunder and Lightnings too; that the burning Mountains of *Italy* abound with them; that they are found scatter'd, but not plentifully, all over *England*. *Borelli*, in his Treatise concerning a great Eruption of *Ætna*, in 1669, argues, that its Fires have been often wholly extinct, but kindled again of themselves.

The Dr. says, the Pyrites will gather an hoary Substance about it, which will also kindle of itself: Allowing this, we may conclude, that the Steams of these kindled Pyrites, meeting with the nitrous and sulphureous Particles of the Air at that Time, caus'd that flow and small Earthquake. It was Winter when it happen'd, and probably, the Air was not then full of nitrous and sulphureous Particles; which was the Reason the Explosion was gradual and slow, according as it had more or less of them in it, or as these Steams were emitted into it more or less plentifully.

A very ingenious and learned Friend of mine suggests, that perhaps the Fall of the Cap of the Mountains in *Steirmark*, might give such a Shock to the Earth under it, as might by the Motion of Undulation, be continued hither, and cause a Trembling in our Earth at that Time; like as when you strike a long stretch'd String of Wire at one End, the Motion is immediately continued to the other: But I see not how this could effect a Calm in the Air,

or cause a Noise to be heard in it at that Time; nor how this Motion could be propagated in an Instant, all over the Places where the Shocks were felt; nor why they should not be felt, as well where it rain'd or blow'd a Storm, as where it was still and calm Weather. I conceive it will be difficult to shew, how such a Motion should cause some People to be sick at Stomach, or Light-headed, others not; it will only follow from it, that the Tops and upper Stories of Houses might be shaken by it, more than the Ground or lower Stories; but he is not very tenacious of his Opinion, and assents to me in this, that 'tis not probable that Earthquakes of large Extent, are made by subterraneous Concussions in all Places.

Do not mistake me, I hold the Earthquake at *Jamaica*, was made by such, and that the Vapours forced from the subterraneous Caverns into our Air, and mixing with the nitrous and sulphureous Particles in it, caused the Explosion which made the Shocks to be felt by the Ships at Sea. I grant that where Eruptions are made, and the Earth falls in, there are subterraneous Explosions, whose Force breaks the Arch of Earth over those Caverns wherein they happen; but then conceive the Earth over them to be no vast Depth or Thickness.

Dr. *Lister* tells me, the Town of *Naples*, (which has suffer'd so much by Concussions) is all undermin'd by subterraneous Fires; and he believes, the Arch of Earth that supports it, is

of so small a Thickness, as I dare scarce relate after him ; tho' he affirms it pretty confidently. *Sicily*, I believe, is much undermin'd ; but I cannot think that all those Places, where Houses have been overthrown, had Caverns under them ; and therefore, you will oblige me, if you will endeavour to get an Account what Towns sunk where the Earth has been rais'd, and what Places have been ruin'd, without any visible Alteration of the Ground on which they stood. I find you correspond sometimes with our Merchants at *Leghorn* ; and it will be no difficult Matter, I conceive, for them to get you such an Account by Means of their Correspondence at *Messina*.

F I N I S.



